MEMORANDUM

SUBJECT: PEKIN (Tazewell County) - Wastewater Treatment Facilities NPDES Permit No. IL0034495 CEI - O&M Inspection

TO: DWPC/FOS and RU

FROM: Kenneth B. Newman, DWPC/FOS, Region 3

DATE: November 4, 1998

INTERVIEWED: Don Gasper, Plant Manager, United Water Services
Larry Wolfer, Operator/Lab Tech, United Water
Dennis Kief, Pekin Public Works Director (by phone)

On the above date an inspection was made of Pekin's wastewater treatment facilities to evaluate NPDES Permit compliance and review operation and maintenance of the facilities. In addition to inspecting WWTP #1, the four on system CSO's were inspected at this time. The above noted people were contacted and interviewed.

United Water Services, Inc. are the contract operators of the wastewater treatment facilities. They are responsible for operation and maintenance of the facilities at Plants #1 and #2 and all the lift stations and the CSO facilities.

The WWTP is attended during a single shift, seven days a week. A dialer alarm system is in place at the plant. The dialer calls the police dispatcher and a call list has been established for contacting operating personnel to respond to an alarm. The system will provide warning of power failure, high influent flow, high primary effluent wet well, high effluent turbidity and high level in the anaerobic digester. In addition, alarm conditions at the lift stations are brought through the dialer. Don reported all the alarms are functional.

There was no discharge from any of the four CSO's at the time of inspection. Monitoring records indicated the last CSO discharges occurred eight days earlier on October 27 when there was about 0.25 inches of rainfall. Discharges of between 1.2 and 1.7 hours in length were recorded at each CSO on this date. The Illinois River was at a level where the back-water area, to which the State and Caroline Street CSO's discharge, was exposed and accessible. The channels leading through the back-water area from the CSO's to the river were checked for evidence of sewage debris and sludge deposits. There were only a few pieces of sewage related debris found in the entire area and there was no evidence of sludge deposits. There was no evidence of sewage debris or

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sludge deposits anywhere in the area of the Court and Fayette Street CSO's. These CSO outfalls discharge directly into the Illinois River channel, which is narrow and has a relatively high velocity.

According to maintenance records, the State Street first flush storage basin has not been cleaned since November 1996. The bar screen has not been cleaned nor has sludge levels been checked since March 98. The City had previously agreed to inspecting the basin after each significant rainfall event.

As best can be determined, the City has not submitted a plan to demonstrate that the CSO's do not cause use impairment or water quality violations. In addition, documentation has not been provided to the Agency as to whether any of the CSO's discharge to sensitive areas, of the City's compliance with the nine minimum controls or of their review and revision of sewer use ordinances. Also, the CSO O&M plan has not been submitted to the Agency.

In March 1998, QST Environmental conducted further investigation into the problem with leakage from the Plant #2 excess flow storage lagoon. The results of this work showed leakage from lagoon was a function of depth and as the level approached a depth of about 5 feet, the leakage rate was about equal to the 1.2 mgd influent flow rate. QST recommended that the lagoon be sealed with a synthetic liner. No further action has been taken by the City. Currently, the City is planning to begin a facilities plan study and continued use of the lagoon and necessary improvements will be considered.

During previous inspections, it has been noted that Plant 1 can not be maintained fully operational at river levels up to the 25 year flood elevation. It has been determined that secondary treatment has to be suspended at river elevations that are some two feet below the 25 year flood elevation. As a result of investigations made during high river conditions during May 98, it was determined flooding of the plant interceptors occurs at elevations that are some five feet below the 25 year flood level. Under these conditions, the plant inlet gate has to be partially closed to limit flow through the plant. As a result, the interceptors are allowed to surcharge and overflow upstream of the plant. In response to a January 29, 1997 violation notice, the City had agreed to submit a report to the Agency of what will be done to provide flood protection. To date, such a report has not been received.

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Further investigation was made this past May to locate a suspected overflow from the south sanitary interceptor sewer. The results of this investigation was reported in a May 98 memorandum. It was determined that there is some route of overflow from the south sanitary interceptor, but the exact location was not found.

The control system to automatically divert and store flow at Plant #2, when Plant #1 is receiving maximum flow, was reported to be fully operational. Currently, the gate is set to close when flow at plant #1 reaches 6.5 mgd and open when flow drops to 5.5 mgd. The operators manually control the return pumps at plant #2.

It was reported that the plant inlet gate automatic control system was operational. However, the system has not been used. Don explained they experience problems with the gate constantly opening and closing, which results in too much variation in the flow rate. In lieu of using the automatic system, they have set the high flow alarm to signal at a flow rate of 7.0 mgd. This way an operator is called in to make necessary adjustments. The automatic motor operated gates located on the combined and Plant #2 interceptors were reported to be operational. According to Gasper, the influent flow meters were being used to control gate operation and the gates were set to close when flows reach 9.0 mgd. With the automatic inlet gate, these gate are used strictly as a second line of control.

At the time of the plant inspection, the influent flow rate was about 3.6 mgd and all flow was being taken through full treatment. The influent wastewater was dark gray and had a strong sewage odor. Some wastewater was being returned from the CSO settling basin at the time. Monitoring data shows the annual average influent flow during the period of October 97 to September 98 was 3.83 mgd. The 3 month low flow average was 3.15 mgd as compared to the plant's DAF of 4.5 mgd. Average influent BOD and TSS concentrations were 176 mg/L and 247 mg/L, respectively.

All flow was being routed through Channel Monster. The bar screen was out of service for repairs to the rake arm hydraulic cylinder. Normally, the screen is used as the primary device and the Channel Monster is used during high flows. Screenings are conveyed to and stored in a dumpster for landfill disposal.

The aerated grit chamber was in service. Don reported they have not been pumping grit from the tank on a regular frequency as the grit washer and dewatering unit is in such poor condition. The City just contracted for the replacement of the unit. It is

suspected work will begin in the next month or so.

All four primary clarifiers were in service. Distribution of flow between the units appeared to be somewhat imbalanced with the northwest unit receiving less flow. The clarifier surfaces were relatively clean of floating material at the time of inspection. Reportedly the operators still manually skim debris periodically. Automatic sludge pumping was recently discontinued as problems were being experienced with the control valves. Sludge is now pumped manually twice a day from each tank. Reportedly, this has resulted in a considerable reduction in the amount of pumpage, while still keeping the sludge levels to less than a foot in each tank. At this point they plan to continue with the manually pumping indefinitely. The valves on the scum collection pits are opened manually every few days to pump scum. Both of the primary sludge pumps were reportedly in good operating condition.

All five of the submersible primary effluent pumps were in place and reportedly in good operating condition. According to Gasper, the pumps have operated without any significant problems during the past year. The pumps are of equal size and are controlled so operation is alternated between all pumps.

Primary effluent was being divided between all three secondary treatment units. The aeration tanks in each unit were being operated in the contact stabilization mode. Mixing in all the tanks appeared adequate. D.O's. were between 1.2 and 1.9 mg/L in the three tanks based on the continuous monitoring meters. According to Gasper these meters are routinely checked for proper calibration. The mixed liquor in all the aeration tanks was brown colored. There was a light amount of brown foam on the surface of the aeration tanks. MLSS concentrations in the contact and reaeration tanks were 1200 and 3140 mg/L in the north unit, 1300 and 2690 mg/L in the south unit and 1430 and 3280 mg/L in the FBOP unit. The SVI's were 417, 538 and 350 in the north, south and FBOP units, respectively. Problems continue to be experienced with slow settling that are attributed to filamentous. Return sludge chlorination is practiced regularly. At the time of inspection, about 20 ppd of chlorine was being feed to each secondary unit.

Compressed air was being supplied by one of the gas engine driven blowers and the one electric motor driven blower. Both blowers were reportedly running at full speed. The second gas engine driven blower was reportedly in operating condition. Don reported he believes the blowers are in need of rebuilding or replacement.

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Operation of the three secondary clarifiers appeared satisfactory. The surface of the north clarifier was relatively clean with only a few small patches of floating sludge scum. There was slightly more sludge scum floating on the surface of the south clarifier. The surface of the FBOP clarifier was essentially clear. Effluent from the north and south clarifiers was pretty much free of visible solids. The FBOP clarifier effluent contained some visible sludge floc. It was noted that all of the RAS tubes were freely flowing in the south clarifier. Two of the six tubes in the north clarifier were plugged. The yokes on top of the return sludge pipes in the north clarifier have not been removed as they were in the south unit. Both of the centrifugal RAS pumps for the FBOP unit were reportedly in good operating condition.

Activated sludge process control testing has consisted of running MLSS and settleometers tests and microscopic examination seven days a week. The MLSS are measured with a Royce meter instead of running gravimetric tests. Larry reported the results obtained with the meter seem to be comparable and consistent with gravimetric measurements when they are performed. Clarifier sludge blankets are measured one to two times a day. Sludge wasting is adjusted according to the direction the operators believe they need to move the process at any point in time.

Wasting from the north and south units is performed automatically with timers that control the air valves on the waste sludge air lifts. Wasting from the FBOP unit is performed periodically in batches using a vertical centrifugal pump that draws from the return sludge line.

At the time of inspection, the effluent chlorination system was not in service, but was reportedly in good operational condition. The continuous monitoring chlorine residual analyzers and controllers are still not used. Feed rates are adjusted manually. Discharge monitoring results for the 1998 disinfection season show there was only a single exceedance of the fecal coliform limit in May.

Discharge monitoring results for the past year shows problems were again experienced with TSS exceedances. Monthly and weekly average limits were exceeded in the months of January, February and March 98. The weekly average limit was also exceeded in September. All the exceedances have been attributed to filamentous problems in the activated sludge.

The effluent flow meters for all three secondary units were

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operational. Total effluent flow was 4.82 mgd. It was noted that monthly average effluent flows tend to be greater than influent flow.

At the time of inspection the CSO settling and chlorine contact basins were nearly empty. There was about a foot of water remaining in the settling basin. There was a considerable accumulation of sludge and sewage debris in both the settling basin and contact basin. The settling basin was last cleaned in mid August.

Discharges from the CSO basin are chlorinated. A flow proportion controlled chlorination system and piping to feed chlorine solution to both the head of the settling basin and the head of the contact basin is provided. Difficulty is still experienced meeting the fecal coliform limits. Results of discharge monitoring shows fecal coliform limits are regularly exceeded. Don reports they continue to find it near impossible to regulate the chlorine feed rate to obtain an adequate residual due to the widely fluctuating flow rates and chlorine demand.

Flow measurement equipment, consisting of a sonic level sensor and RIT meter are used to measure the CSO basin discharge. The meter was reported to be in good operating condition.

All waste activated sludge is routed to the aerobic digester located in the south secondary treatment unit. The tank is used essentially as an aerated holding tank ahead of the gravity belt thickener. Don reports they no longer thicken sludge by decanting as this results in varying sludge concentration that makes control of the gravity belt thickener more difficult.

The gravity belt thickener was in operation at the time of inspection. According to Don, the thickener is operated about seven hours a day, seven days a week.

The 88 and 39 anaerobic digesters were in service. The digesters are operated as a two stage system. The 88 digester is used as the first stage and the 39 digester as the second stage. The 64 digester was still not in service from the prison expansion project. Reportedly, problems are being experienced with the compressed gas mixers. The digester has been filled with sludge transferred from the 88 digester and they have been heating it. Don explained alkalinity concentrations are low and he wants to add some sodium bicarbonate before starting it up. However, he wants to get the gas mixers operating first. The east 39 digester is

still used as a sludge storage tank.

The 88 digester is heated via continuous recirculation through an external heat exchanger. Heat to the exchanger can be supplied by either a gas fired boiler or cooling water from a gas engine driven generator. The boiler and generator can be fired with either digester or natural gas. Digester gas is used as the primary fuel. They try to maintain the digester temperature at 95° to 97°. At the time of inspection, the temperature was about 96°. Mixing is accomplished with a compressed gas injection system that is run continuously.

The 39 digester is not heated, but the gas collection system is tied to the 88 digester. Supernatant decanting has not been performed as problems have been experienced in the past with effluent exceedances that seemed to be related to returning digester supernatant.

Analyses performed on the digested sludge drained to the lagoon show volatile solids have ranged between 49 and 65% with an average of about 58%. Results of monthly volatile solids reduction calculations, which are made to demonstrate vector attraction reduction, show reductions ranging between 24 and 68%.

The vacuum drying beds were last used to dewater sludge in May of 97. All equipment was reported to be functioning last time they were operated

About 5.6 MG of digested sludge has been transferred to the sludge lagoon since November 97. At the average sludge concentration of 2.2% this would be about 514 dry tons of solids. During this same time, about 760 dry tons was removed and land applied. Based on these figures, it appears sludge is being disposed as it is generated. At the time of inspection, there was about four feet of freeboard in the sludge lagoon.

The gas fired Caterpillar electric generator was being operated at the time of inspection. Don reported they have continued to run the generator to take advantage of the digester gas and lower their utility charges. The unit is normally used to power the plant during the electric rate demand time of year, which has been from June through mid September. The generator is capable of supplying all the electric needs of the plant except for the electric motor driven blower. Don reports operation of the generator system has been pretty much problem free.

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Routine monitoring samples have been collected of the plant influent and the final effluent five times a week. Automatic samplers are used to collect 24 hour composites from both locations. In addition, grab samples are collected of the effluent for the pH testing and chlorine residual and fecal coliform analyses when disinfection is required. Composite samples are refrigerated during collection. There were thermometers in both sampler refrigerators and proper temperature was being maintained.

It appears grab samples have been collected of the CSO basin effluent when there have been discharges. A sample collection bottle is mounted at the outfall structure for purposes of collecting discharge samples when the plant in unattended. Don reports that samples collected in this manner are only analyzed if the discharge has stopped prior to the operators coming in for the day. Otherwise, if the discharge is still occurring, a fresh grab sample is collected by the operators.

Discharge monitoring samples have been sent to Daily Analytical Laboratories for BOD, TSS and ammonia analyses. Chlorine residual, pH and fecal coliform discharge monitoring analyses and process control tests are still performed at the plant laboratory.

Discharge monitoring reports have been submitted in a timely manner. A detailed review of discharge monitoring records was not performed during this inspection.

The following is a summary of apparent violations and operation and maintenance deficiencies that were identified as a result of this inspection.

Apparent Violations:

1. Total suspended solids limits for discharge 001 were exceeded in the months of January, February, March and September 1998.

2. Fecal coliform limits for discharge 002 were exceeded during nine of the past 12 months.

3. Plant #1 is not adequately protected against flooding to where it can remain fully operational up to the 25 year Illinois River flood elevation.

4. Several reports relative to compliance with special

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condition #6 of the NPDES Permit have not been submitted. These reports include the documentation indicating whether any of the CSO outfalls discharge to sensitive areas, the City's compliance with the nine minimum controls and of their review and revision of sewer use ordinances. Also, the CSO O&M plan has not been submitted to the Agency.

Operation and Maintenance Deficiencies:

1. The overflow from the south sanitary sewer interceptor has not been located and eliminated.

2. Corrective action has not been taken to seal the sewage holding lagoon at Plant #2 to prevent leakage of inadequately treated sewage into the groundwater.

3. The State Street first flush basin is not being inspected and maintained on a regular frequency.

4. Accumulated sewage debris is not being regularly removed from the CSO settling and chlorine contact basins.

5. Adequate dissolved oxygen concentrations are not being maintained in the activated sludge aeration tanks at all times.

This memo and the attached Form 3560-3 and DMR Summary are provided as documentation of this inspection and serve to update the file.

Kenneth B. Newman

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Attached: Form 3560-3
DMR Summary

cc: DWPC/CAS
Peoria Files